Space Weather Forecast

Issued on Thursday, 09 May 2024 at 13:38 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Further X-class flares (R3 - Strong radio blackouts) likely. G1-G2 Minor-Moderate geomagnetic storm conditions expected later on the 10 May onwards with coronal mass ejection (CME) arrivals expected. Chance of G3 Strong geomagnetic storm intervals.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity is High with a double peak Strong flare from the very large AR3664 sunspot in the southwest at 08/2140 UTC and an Strong flare from the same region at 09/0913 UTC. This combined with frequent higher Moderate class flares from both AR3664 and the other large sunspot region in the far northwest during the past 24-hour period. There are seven sunspot regions on the visible disc, with two currently unnumbered small regions in the northeast quadrant. AR3664 remains, by far, the largest and most active flaring region on the disc. Areal extent continues to increase and the region remains extremely magnetically complex. Accurate assessment of the previously large sunspot region in the far northwest becoming increasingly difficult as it approaches the limb, but there appears to be a waning in size and complexity resulting in a slight reduction in flare risk. The remaining sunspots on the disc are smaller, more stable and magnetically much more simple.

Multiple likely Earth-directed CMEs were observed leaving the sun through the 08 May, associated with flares from the large and complex AR3664. These CMEs are currently expected to arrive at Earth later on the 10 May or early on the 11 May, with impacts perhaps persisting into the 12 May. The most recent Strong flare at 09/0913 UTC looks to have produced another potentially Earth directed CME with full modeling and assessment pending further imagery. The large filament (arc of plasma) liftoff in the northeast quadrant, starting around 08/1807 UTC also produced a CME which was assessed as have a potentially glancing Earth directed component into the 11th, further complicating the forecast.

Solar Wind / Geomagnetic Activity: Solar winds declined slightly but remained at slightly elevated levels, 420-460km/s, as the connection to the fast wind of a coronal hole continued to ease. The Interplanetary Magnetic Field was at weak levels throughout with the important north-south component also varying weakly. Geomagnetic activity was Quiet (Kp 1-2).

Energetic Particles / Solar Radiation: Solar radiation was at normal background levels although indicated minor response following the recent Strong flares from the southwest sunspot region, the latest of which is currently ongoing.

Four-Day Space Weather Forecast Summary
Solar Activity: High solar activity is forecast with frequent Moderate flares expected and isolated Strong flares likely, principally from the large sunspot region located in the southwest of the visible disc.

Solar Wind / Geomagnetic Activity: There are multiple potentially Earth-directed coronal mass

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ejections (CMEs) in the forecast period. There remains a slight chance of glancing impacts through day 1 into early day 2 (09-10 May). Likely more significant CME impacts expected either later day 2 (10 May), or more likely early on day 3 (11 May), these from the combination of a sequence of larger CME's all associated with the large sunspot in the southwest disk.

Outside of CME influence Earth seeing currently slightly elevated solar winds likely to fall to background levels by day 2 (10 May). With some faster winds possible from late day 3 (11 May) onwards.

Geomagnetic activity likely remaining Quiet to Unsettled to start the period, with just a slight chance of isolated Active to Minor Storm (Kp5) intervals. Activity should increase to G1-G2/Minor-Moderate (Kp 5-6) Storm levels, with a chance of G3/Strong (Kp 7) Storm conditions from later day 2 or perhaps more likely early day 3 (10-11 May), with these elevated conditions expected to persist into day 4 (12 May).

Energetic Particles / Solar Radiation: There is an ongoing chance for a Minor Storm or greater solar radiation event occurring throughout the period, associated with significant solar flares from the two large sunspot groups in the western hemisphere of the visible disc.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	80	90	80
Strong	G3	No	1	30	40	30
Severe	G4	No	1	5	10	5
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	95	95	95	95
Very Active	R3 to R5 X	Yes	60	60	60	60

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	40	40	40	40
Very Active	≥ S3 *	No	5	5	5	5

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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